

Gregory S. Mitchell

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Education

1999 Ph.D. Physics, University of Wisconsin-Madison
Dissertation: *A precision measurement of the spin structure function $g_1(x, Q^2)$ for the proton and deuteron* (SLAC E155)
1992 B.S. Physics, B.S. Mathematics, Penn State
with honors in Physics, with distinction, Phi Beta Kappa

Employment

2003- Technical Staff Member (Los Alamos National Laboratory)
2000-2002 Postdoctoral Research Associate (Los Alamos National Laboratory)
1995-1999 Research Assistant (University of Wisconsin-Madison)

Research Interests and Experience

Experimental nuclear and particle physics, particularly: nucleon structure, electron scattering, hadronic weak interactions, and fundamental symmetries.

Entire research career has focused on mid-sized particle and nuclear physics experiments using polarized beams and/or targets.

Broad experience with: simulation and experimental design; detector building; data acquisition design and programming; and analysis.

Research Interests and Experience (continued)

At Los Alamos, I have worked with five experiments. Three experiments are fundamental nuclear physics, using asymmetries to study the weak interaction at low energy scale. My primary research focus has been one of these experiments ($\vec{n} + p \rightarrow d + \gamma$), which is commissioned with the exception of the target, and should begin taking production data in 2005. The other two fundamental physics experiments are in development. The two programmatic experiments are in development, with preliminary results for the small one expected in 2005, for the large one in 2006.

- NPDGamma: Hadronic parity violation, $\vec{n} + p \rightarrow d + \gamma$ at LANSCE
 - Developed VME/Linux DAQ system, including budget responsibility
 - Wrote experimental analysis software
 - Constructed ^6Li detector for independent measurement of neutron flux, used in Fall 2000, January 2004 test runs to benchmark full experiment Monte Carlo
 - Developed and tested current mode CsI(Tl)-photodiode gamma-ray detectors
- Q_{weak} Experiment (E-02-020 at Jefferson Lab)
 - Developed design and prototype for quartz current mode Cerenkov detectors
 - Performed Monte Carlo background calculations
- abBA: Pulsed Cold Neutron Beta Decay (LANSCE/Oak Ridge)
 - Tested prototype thin dead layer silicon detectors
 - Performed Monte Carlo rate calculations and backscattering estimates
- Two programmatic projects (one small, one large scale) dealing with properties of Pu
 - Developed VME/Linux DAQ system for readout of Si PIN diodes
 - Developed control software for spectroscopy amplifier, vacuum system, xyz stage
 - Performed Monte Carlo rate calculations and feasibility studies

My graduate research was performed at SLAC, where I worked with four experiments. All experiments were part of the spin structure function measurement program, using a polarized electron beam incident on a polarized fixed target. My research focus was on E154 and E155, with significant contributions made to E143 and E155X.

- SLAC E155: Spin structure functions of the proton and deuteron
 - Leader of student analysis effort
 - Performed next-to-leading order QCD fit of world g_1 data
 - Responsible for improvements and maintenance of tracking reconstruction
 - Built beam-defining hodoscope for calibration test run T418
- SLAC E154: Spin structure functions of the neutron
 - Wrote group analysis software for data summary tape management, batch job submission, and event selection (used for E154/E155/E155X)
 - Contributed to simulation, setup, magnetic measurements, checkout, operation, and analysis for Møller polarimeter

Refereed Publications

1. *A current mode detector array for gamma asymmetry measurements*, M. Gericke *et al.*, July 2004. [Submitted to Nuclear Instruments and Methods in Physics Research Section A.]
2. *A measurement of parity-violating gamma-ray asymmetries in polarized cold neutron capture on ^{35}Cl , ^{113}Cd , and ^{139}La* , G.S. Mitchell *et al.*, Nucl. Instr. Meth. A **521**, 468 (2004).
3. *A measurement of the flight path 12 cold H_2 moderator brightness at LANSCE*, P.-N. Seo *et al.*, Nucl. Instr. Meth. A **517**, 285 (2004).
4. *Precision Measurement of the Proton and Deuteron Spin Structure Functions g_2 and Asymmetries A_2* , E155 Collaboration, P.L. Anthony *et al.*, Phys. Lett. B **553**, 18 (2003).
5. *Measurements of the Q^2 -Dependence of the Proton and Neutron Spin Structure Functions g_1^p and g_1^n* , E155 Collaboration, P.L. Anthony *et al.*, Phys. Lett. B **493**, 19 (2000).
6. *Measurement of the Deuteron Spin Structure Function $g_1^d(x)$ for $1 (\text{GeV}/c)^2 < Q^2 < 40 (\text{GeV}/c)^2$* , E155 Collaboration, P.L. Anthony *et al.*, Phys. Lett. B **463**, 339 (1999).
7. *Inclusive Hadron Photoproduction from Longitudinally Polarized Protons and Deuterons*, E155 Collaboration, P.L. Anthony *et al.*, Phys. Lett. B **458**, 536 (1999).
8. *Measurement of the Proton and Deuteron Spin Structure Functions g_2 and Asymmetry A_2* , E155 Collaboration, P.L. Anthony *et al.*, Phys. Lett. B **458**, 529 (1999).
9. *A Møller Polarimeter for High Energy Electron Beams*, H.R. Band *et al.*, Nucl. Instr. Meth. A **400**, 24 (1997).
10. *Next-to-Leading Order QCD Analysis of Polarized Deep Inelastic Scattering Data*, E154 Collaboration, K. Abe *et al.*, Phys. Lett. B **405**, 180 (1997).
11. *Measurement of the Neutron Spin Structure Function g_2^n and Asymmetry A_2^n* , E154 Collaboration, K. Abe *et al.*, Phys. Lett. B **404**, 377 (1997).
12. *Precision Determination of the Neutron Spin Structure Function g_1^n* , E154 Collaboration, K. Abe *et al.*, Phys. Rev. Lett. **79**, 26 (1997).
13. *Simulation Studies of a Scintillating Fiber Tracker for the SDC Detector*, J. Hertzler *et al.*, Nucl. Instr. Meth. A **344**, 355 (1994).

Other Publications

1. *Qweak: A Precision Measurement of the Proton's Weak Charge*, G.S. Mitchell (for the Qweak Collaboration), `hep-ex/0308049` (2003). [CIPANP 2003 proceedings.]
2. *A Precision Measurement of the Spin Structure Function $g_1(x, Q^2)$ for the Proton and Deuteron*, G.S. Mitchell, SLAC-Report-540 (1999). [Ph.D. Thesis.]
3. *Spin Structure Functions g_1 and g_2 for the Proton and Deuteron*, G.S. Mitchell (for the E155 collaboration), `hep-ex/9903055`, SLAC-PUB-8104 (1999). [DPF 99 proceedings.]

Talks

Progress toward a Measurement for the $\vec{n} + p \rightarrow d + \gamma$ Experiment. DNP Fall Meeting, Chicago, IL (October 30, 2004).

A New Flight Path at LANSCE for the $\vec{n} + p \rightarrow d + \gamma$ Experiment. APS April Meeting, Denver, CO (May 4, 2004).

Very Small Asymmetries and the Weak Interaction. TRIUMF Seminar, Vancouver, BC (December 1, 2003).

Qweak: A Precision Measurement of the Proton's Weak Charge. Conference on the Intersections of Particle and Nuclear Physics, New York, NY (May 20, 2003).

The Hadronic Weak Interaction. LANL Physics Postdoc Symposium, Los Alamos, NM (September 18, 2002).

Parity-Violating Asymmetry in $\vec{n} + p \rightarrow d + \gamma$. LANL P-25 Seminar, Los Alamos, NM (April 30, 2002).

Detector Alignment for a Parity-Violating Asymmetry Measurement in $\vec{n} + p \rightarrow d + \gamma$. APS April Meeting, Albuquerque, NM (April 21, 2002).

The Hadronic Weak Interaction: Parity-Violating Asymmetry in $\vec{n} + p \rightarrow d + \gamma$. High Energy Physics / Heavy Ion Physics Seminar, University of Illinois at Chicago, Chicago, IL (January 14, 2002).

Parity-Violating Asymmetry in $\vec{n} + p \rightarrow d + \gamma$. LANSCE User Group Meeting, Los Alamos, NM (August 14, 2001).

Nucleon Spin Structure: SLAC E155/E155X. Experimental Nuclear Physics Seminar, University of Maryland, College Park, MD (October 1999).

Nucleon Spin Structure Functions: SLAC E155/E155X. LANL P-23 Seminar, Los Alamos, NM (August 27, 1999).

Spin Structure Functions g_1 and g_2 for the Proton and Deuteron. DPF Meeting, UCLA, Los Angeles, CA (January 7, 1999).

SLAC Experiment E155: Nucleon Spin Structure. Caltech HEP Seminar, Pasadena, CA (December 7, 1998).

A Precision Measurement of the Proton Spin Structure Function g_1 . DNP Fall Meeting, Santa Fe, NM (October 31, 1998).

Teaching Experience

2000-2003 Postdoctoral Research Associate & TSM (Los Alamos National Laboratory)

Mentored graduate students working with the P-23 Low Energy Neutron Team

1999 Postdoctoral Research Associate (University of Wisconsin-Madison)

Mentored graduate students working on analysis of SLAC experiment E155X

1996-1999 Tour guide (SLAC)

Led tours of SLAC, each including auditorium talk and bus tour of accelerator and experimental facilities

1994-1995 Teaching assistant (University of Wisconsin-Madison)

Taught laboratory and discussion sections, responsible for sixty students in each of two semesters of non-calculus physics

1990-1991 Math tutor (Penn State)

Tutored groups and drop-in individuals for courses in differential equations

Computer Skills

Extensive experience programming in C, C++, Fortran, Perl, in a group environment; using ROOT and PAW/CERN libraries, L^AT_EX

Adept with LabVIEW, EGS, MCNP, IGOR Pro, Mathematica, Tcl/Tk, HTML

Designed and maintained official experiment web pages at SLAC and LANL

References

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